

ENVIRONMENTAL IMPACT ANALYSIS

4.5 GEOLOGY AND SOILS

Acronyms

AMSL	Above mean sea level
A-P Zone	Alquist-Priolo Earthquake Special Studies Zone
ASCE	American Society of Civil Engineers
BMPs	Best management practices
Cal/OSHA	California Division of Occupational Safety and Health
CBC	California Building Code
CCR	California Code of Regulations
CDWR	California Department of Water Resources
CGS	California Geological Survey
CPT	Cone Penetration Test
CWA	Clean Water Act
EIR	Environmental Impact Report
FEMA	Federal Emergency Management Agency
GLA	Geo-Logic Associates
IBC	International Building Code
ICC	International Code Council
MCE	Maximum credible earthquake
MPE	Maximum possible earthquake
NPDES	National Pollutant Discharge Elimination System
PRC	Public Resources Code
SCLF	Scholl Canyon Landfill
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
USGS	United States Geological Survey

This section describes existing geologic and soil conditions in the proposed Project area, addresses the potential for geologic hazards to impact the proposed Project area, identifies associated potential geotechnical impacts related to development and construction of the proposed Project, and evaluates the significance of the potential hazards on or resulting from the proposed Project.



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4.5.1 Environmental Setting

4.5.1.1 Regional Hydrogeology

According to the California Department of Water Resources (CDWR) Bulletin 118 Report, the proposed Project site is not located within a mapped groundwater basin. The closest groundwater basin is the San Fernando Valley Groundwater Basin of the South Coast Hydrologic Region (4-12), located to the west of the proposed Project site. The basin is approximately 226 square miles and is bounded on the north and northwest by the Santa Susana Mountains, on the north and northeast by the San Gabriel Mountains, on the east by the San Rafael Hills, on the south by the Santa Monica Mountains and Chalk Hills, and on the west by the Simi Hills (CDWR, 2004).

4.5.1.2 Regional Geology

The Project site is located in the northwestern portion of the Transverse Range Geomorphic Province in the southwestern part of California. The region is separated by an east-west trending series of steep mountain ranges and valleys, sub-parallel to faults branching from the San Andreas Fault. The proposed Project site resides in the portion of the Province drained by the Los Angeles River.

California Highway 134 is located approximately 0.25 miles southwest of the site, California Highway 210 is located approximately two miles east of the site, and the Los Angeles River is located approximately 4.9 miles west of the proposed Project site. Based on interpretation of the ground surface elevation contour lines drawn on the topographic map, the proposed Project site is located at an elevation of approximately 1,410 to 1,485 feet (North American Vertical Datum of 1988) above mean sea level (AMSL). The topography in the vicinity of the proposed Project site is hilly, with a slope to the south then southwest toward the Los Angeles River (USGS, 1995).

4.5.1.3 Local Geology

Based on information depicted on the 2005 Geologic Map of Los Angeles, the proposed Project site is underlain by Mesozoic age quartz diorite deposits composed of plagioclase feldspar (oligoclase-andesine, hornblende, biotite, and minor quartz). Sometimes referred to as the Wilson Diorite, this unit is the most widespread bedrock type in the Glendale area. The bulk of the Verdugo Mountains and the San Rafael Hills are comprised of quartz diorite. The color of the rock is typically a light gray to light brown. The texture is generally medium grained, and the structure is massive. In the central part of the San Rafael Hills, just north of Highway 134, at the southeastern margin of Glendale, the mineral grains are aligned, giving the rock a distinct banding or “foliation” resulting in a somewhat layered structure. In this area, the structure dips 60 to 70 degrees to the east and northeast (Earth Consultants International, 2003).

4.5.1.4 Site Surface Conditions

The proposed Project site is bordered by natural slopes on the south and southeast. The northern, western, and northeastern sides border the existing landfill.



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Most of the area to be developed is relatively flat, at an elevation of approximately 1,410 feet AMSL. The surface begins to steepen in the northeastern portion of the site, rising to almost 1,500 feet east of the northeast corner of the site, where a cut slope is proposed. The ground surface has been cleared and is devoid of vegetation, except in limited areas in the northeastern part of the proposed Project site, where portions of the landfill are exposed at the surface. Existing structures and equipment associated with operation of the landfill are located throughout the area.

4.5.1.5 Seismicity

The proposed Project site, as is most of California, is located in a seismically active area. The estimated distances from the proposed Project site to the nearest expected surface expression of nearby faults is presented in **Table 26** below. The maximum moment magnitude is the measurement of maximum motion recorded by a seismograph; whereby “moment” is equal to the rigidity of the earth times the average amount of slip on the fault times the area of ground surface that slipped.

Table 26 Distance of Faults to Project Site and Maximum Magnitudes

Fault	Distance* (miles)	Maximum Moment Magnitude*
Verdugo	0.3	6.9
Raymond	2.3	6.8
Hollywood	3.3	6.7
Sierra Madre (connected)	3.9	7.2
Elysian Park Thrust	6.1	6.7
Santa Monica	6.2	7.4
Sierra Madre (San Fernando)	10.5	6.7
Clamshell-Sawpit	11.1	6.7
Puente Hills (LA Basin)	11.5	7.0
San Gabriel	12.4	7.3
Elsinore	13.7	7.8
Newport-Inglewood (LA Basin)	13.7	7.5
Santa Monica	13.9	7.3
Northridge	15.2	6.9
Puente Hills (Santa Fe Springs)	17.3	6.7
San Jose	19.6	6.7
Puente Hills (Coyote Hills)	19.9	6.9
Malibu Coast	21.0	6.7
Anacapa-Dume	22.7	7.2
Palos Verdes	24.4	7.7

* Measured from 2008 National Seismic Hazard Maps (USGS, 2008).



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The proposed Project site is not located within a currently mapped California Earthquake Fault Zone, as presented in the table above; the nearest fault is the Verdugo Fault, located approximately 0.3 miles to the southwest of the proposed Project site. Based on available geologic data, there is low potential for surface fault rupture from the Verdugo Fault and other nearby active faults propagating to the surface of the proposed Project site during design life of the proposed development.

The Scholl Canyon faults were mapped by Byer (1968), and Envicom (1975) suggested that this fault zone connects the Verdugo Fault in the west to the Eagle Rock Fault in the east. However, more recent mapping by Dibblee (1989) does not even show these faults, and there is no data available to indicate that these fault traces, if even present, are active. The Hazards Map in the Glendale General Plan shows the Scholl Canyon Fault, as mapped by Byer, on Plate P-1 of the Safety Element of the Glendale General Plan (Glendale 2003).

4.5.1.6 Site Soils

Based on soil assessment work conducted by Stantec in December 2015, soils within the footprint of the proposed power generation facility consist of those presented in **Table 27** below.

Table 27 Site Soils

Soil Symbol	Soil Type	Description
SM	Silty Sand with Gravel	Silty sand with gravel; 7.5 YR 3/3 dark brown; 15 percent fine gravel; 65 percent fine to coarse grained sand; 20 percent fines; moist; medium dense; no staining; no odor (FILL).
Wqd	Wilson Quartz Diorite	Weathered dioritic-granitic bedrock; dark yellowish brown; dry; very dense; moderately fractured.
Qns	Natural Soil	Silty sand with gravel; brown; dry; loose; sand is very fine to coarse grained; rootlets (NATIVE)

Source: Stantec, 2016

4.5.2 Laws, Ordinances, Regulations and Standards

4.5.2.1 Federal

Clean Water Act (Erosion Control)

The Federal Clean Water Act (CWA) (33 USC 1251 et seq.), formally known as the Federal Water Pollution Control Act of 1972, was enacted with the intent of restoring and maintaining the chemical, physical, and biological integrity of the waters of the United States. The Federal CWA requires states to set standards to protect, maintain, and restore water quality through the regulation of point-source and certain nonpoint-source discharges to surface water. Such discharges are regulated by the National Pollutant Discharge Elimination System (NPDES) permit process (Federal CWA Section 402). Projects that disturb one-acre or more are required to obtain NPDES coverage under the NPDES General Permit for Stormwater Discharges Associated with Construction Activity (Construction General Permit)



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administered by the State Water Resources Control Board (SWRCB), Order No. 2009-0009-DWQ amended by 2010-0014-DWQ & 2012-0006-DWQ (SWRCB, 2013). The Construction General Permit requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP), which includes best management practices (BMPs) to regulate stormwater runoff, including measures to prevent soil erosion. Requirements of the CWA and associated SWPPP are described in further detail in Section 4.8, Hydrology and Water Quality of this Environmental Impact Report (EIR).

Earthquake Hazards Reduction Act

The Earthquake Hazards Reduction Act was enacted in 1977 to “reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards and reduction program.” To accomplish this, the Act established the National Earthquake Hazards Reduction Program. This program was significantly amended in November 1990, which refined the description of agency responsibilities, program goals, and objectives.

National Earthquake Hazards Reduction Program’s mission includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improvement of building codes and land use practices; risk reduction through post-earthquake investigations and education; development and improvement of design and construction techniques; improvement of mitigation capacity; and accelerated application of research results. The National Earthquake Hazards Reduction Program designates the Federal Emergency Management Agency (FEMA) as the lead agency of the program and assigns it several planning, coordinating, and reporting responsibilities. Programs under National Earthquake Hazards Reduction Program help inform and guide planning and building code requirements such as emergency evacuation responsibilities and seismic code standards such as those to which the proposed Project would be required to adhere.

International Building Code

The International Building Code (IBC) is the national model building code developed by the International Code Council (ICC) providing standardized requirements for construction. The IBC replaced earlier regional building codes (including the Uniform Building Code) in 2000 and established consistent, minimum requirements to safeguard public health, safety and general welfare of the occupants of new and existing buildings and structures (ICC, 2018). In 2006, the IBC was incorporated into the 2007 California Building Code, and currently applies to all structures being constructed in California. The current version of the IBC is the 2018 edition, also known as ICC IBC-2018. A new edition of the IBC is promulgated every three years.

4.5.2.2 State

Alquist-Priolo Earthquake Fault Zoning Act – Affected Local Agencies

The state legislation protecting the population of California from the effects of fault-line ground-surface rupture is the Alquist-Priolo Earthquake Fault Zoning Act (California Public Resources Code [PRC] 1972, 1997), passed in the wake of the 1971 Sylmar (or San Fernando) Earthquake, which resulted in extensive surface fault ruptures that damaged numerous structures. The Act is intended to a) prevent the



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construction of buildings intended for human occupancy on the surface traces of active faults, and b) to increase safety and minimize the loss of life resulting from earthquakes by facilitating seismic retrofitting to strengthen buildings against ground shaking. At the direction of the Act, in 1972 the State Geologist became responsible for delineating Earthquake Fault Zones (called Special Studies Zones prior to 1994) around active and potentially active fault traces to reduce fault-rupture risks to structures for human occupancy. The zones are revised periodically and extend 200 to 500 feet on either side of identified active fault traces. The California Geological Survey (CGS) has prepared nearly 600 maps delineating Earthquake Fault Zones, which are provided to cities and counties in planning, zoning, and building regulation functions.

Local agencies must enforce the Act in the development permit process, where applicable, and may be more restrictive than State law requires. According to the Act, before a project can be permitted, cities and counties must require a geologic investigation, prepared by a licensed geologist, to demonstrate that buildings will not be constructed across active faults. If an active fault is found, a structure for human occupancy cannot be placed over the trace of the fault and must be set back. Although setback distances may vary, a minimum 50-foot setback is required.

Seismic Hazards Mapping Act – Affected Local Agencies

The Seismic Hazards Mapping Act protects the public from geo-seismic hazards other than surface faulting, such as strong ground shaking, liquefaction, landslides, and other ground failures. The Act's regulations apply to public buildings intended for human occupancy and a large percentage of private buildings intended for human occupancy. The Act became effective in 1991 with the purpose of identifying and mapping seismically hazardous areas to assist cities and counties in preparing the safety elements of their general plans and to encourage land use management policies and regulations that reduce seismic hazards. Under the terms of the Act, cities and counties must require a geotechnical report defining and delineating any seismic hazard prior to the approval of a project in a state-identified seismic hazard zone. The local jurisdiction is required to submit one copy of the approved geotechnical report to the State Geologist within 30 days of approval of the report.

The Act requires the State Geologist to prepare maps that delineate Liquefaction Zones of Required Investigation and Earthquake-Induced Landslide Zones of Required Investigation in the Los Angeles Basin and San Francisco Bay areas. Mapping has been completed for the project area and hazards have been identified (e.g., earthquake shaking, liquefaction, earthquake-induced landslides) and evaluated (CGS, 1999).

California Building Code

California Code of Regulations (CCR) Title 24, Part 2, the California Building Code (CBC), provides minimum standards for building design in the state. The current CBC, published July 1, 2016 with an effective date of January 1, 2017, is based on the 2015 IBC but includes numerous State of California amendments. Given the State's susceptibility to seismic events, the seismic standards within the CBC are strict and include requirements to reduce the risks associated with buildings in designated seismic hazard zones to the maximum extent practical. In turn, each jurisdiction in California may adopt its own building



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code based on the CBC, which is permitted to be more stringent than the CBC, but, at a minimum, is required to meet all state standards and enforce the regulations of the CBC.

Chapter 16 of the CBC deals with structural design requirements governing seismically resistant construction (Section 1604), including factors and coefficients used to establish seismic site class and seismic occupancy category for the soil/rock at the building location and the proposed building design (Sections 1613.5 through 1613.7). Chapter 18 includes the requirements for foundation and soil investigations (Section 1803); excavation, grading, and fill (Section 1804); allowable load-bearing values of soils (Section 1806); and the design of footings, foundations, and slope clearances (Sections 1808 and 1809), retaining walls (Section 1807), and pier, pile, driven, and cast-in-place foundation support systems (Section 1810). Chapter 33 includes requirements for safeguards at work sites to ensure stable excavations and cut or fill slopes (Section 3304). CBC includes (but is not limited to) grading requirements for the design of excavations and fills and for erosion control. Construction activities are subject to occupational safety standards for excavation, shoring, and trenching as specified in the California Division of Occupational Safety and Health (Cal/OSHA) regulations (CCR Title 8). The CBC is revised every three years.

4.5.2.3 Local

City of Glendale Building and Safety Code

The Grading Section of the CBC 2016, was adopted into the Glendale Building and Safety Code, 2017. The City's Code was amended to read as follows: "The provisions of this chapter apply to grading, excavation, and earthwork construction, including fills and embankments and the control of grading site runoff, including erosion sediments and construction-related pollutants. Where conflicts occur between the technical requirements of this chapter and the geotechnical report, the more restrictive requirement shall govern."

Grading permit application submittal and approval is required for projects in the City. All projects requiring a grading permit must prepare a Soil Engineering Report and Engineering Geology Report that includes recommendations to be incorporated in the grading plans or specifications as a condition of project approval. Additionally, an electric service plan must be obtained from Glendale Water & Power and included in the grading permit application package.

City of Glendale General Plan, Safety Element

The Glendale General Plan, Safety Element includes the following policies applicable to seismic hazards:

Goal 1: Reduce the loss of life, injury, private property damage, infrastructure damage, economic losses and social dislocation and other impacts resulting from seismic hazards.

- **Policy 1-1:** The City shall ensure that new buildings are designed to address earthquake hazards and shall promote the improvement of existing structures to enhance their safety in the event of an earthquake.



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- **Policy 1-2:** The City shall enforce the provisions of the Alquist-Priolo Earthquake Fault Zoning Act and the Seismic Hazards Mapping Act, with additional local provisions.
- **Policy 1-3:** The City shall ensure to the fullest extent possible that, in the event of a major earthquake, essential structures and facilities will remain safe and operational. Essential facilities include hospitals, police stations, fire stations, emergency operation centers, communication centers, generators and substations, reservoirs and “lifeline” infrastructure.
- **Policy 1-4:** The City shall ensure that current seismic and geologic knowledge and State-certified professional review are incorporated into the design, planning and construction stages of a project, and that site-specific data are applied to each project.
- **Policy 1-5:** The City shall ensure that all residents and business owners in the City have access to information regarding seismic and geologic hazards.

Goal 2: Reduce the loss of life, injury, private property damage, infrastructure damage, economic losses and social dislocation and other impacts resulting from geologic hazards.

- **Policy 2-1:** The City shall avoid development in areas of known slope instability or high landslide risk when possible and will encourage that developments on sloping ground use design and construction techniques appropriate for those areas.

4.5.3 Methodology and Thresholds of Significance

4.5.3.1 Methodology

Information from the Geo-Logic Associates Geotechnical Report (GLA; 2012), Sanitation Districts of Los Angeles County – Planning Section and AECOM (2014) Draft Environmental Impact Report, Geotechnical Investigation Report (Stantec, 2016, Appendix D), and the City of Glendale General Plan was included for the analysis supporting impact conclusions in the following section. Data and conclusions from the analyses were used to determine potential impacts from the proposed Project to and from Project site geology and soils parameters. These impacts were compared against the Thresholds of Significance set forth below in Section 4.5.3.2 to determine their significance.

4.5.3.2 Thresholds of Significance

As determined in the Initial Study, the proposed Project does not have soils that are incapable of supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater. The Project does not include the construction of new septic tanks or alternative wastewater disposal systems, and there would be no impact in this regard. In addition, the proposed Project would not directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. The potential to encounter unique paleontological resources is low because the majority of the proposed Project area has been previously disturbed by landfill and other urban activities. The proposed Project will not directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. As there would be no impact for these two topics, only the following four checklist questions were determined to result in potentially significant impacts and are evaluated in this EIR.



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In accordance with Appendix G of the State CEQA Guidelines, the proposed Project would have a significant impact related to geology and soils if it would:

- Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
 - Rupture of a known earthquake fault, as delineated on the most-recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area of based on other substantial evidence of a known fault;
 - Strong seismic ground shaking;
 - Seismic-related ground failure, including liquefaction; or
 - Landslides.
- Result in substantial soil erosion or the loss of topsoil.
- Be located on a strata or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code, creating substantial direct or indirect risks to life or property.

4.5.4 Project Impacts

Threshold: Would the Project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction?

Fault Rupture Hazard

The Alquist-Priolo Earthquake Fault Zoning Act mitigates fault rupture hazards by prohibiting the location of structures for human occupancy across the trace of an active fault. The Act requires the State Geologist to delineate "Earthquake Fault Zones" along faults that are "sufficiently active" and "well defined." The boundary of an "Earthquake Fault Zone" is generally 500 feet from major active faults and from 200 to 300 feet from well-defined minor faults. The Scholl Canyon Landfill (SCLF) and the approximately 2.2-acre site lying within the inactive portion of the landfill proposed for the proposed Project, is located in a seismically active area and would experience strong ground motions during a large earthquake event. However, no evidence of surface traces of active faults (having experienced displacement within the Holocene period (i.e. in the last 10,000 years) at the SCLF were identified as part of the geotechnical investigation for the landfill expansion project or in other previous geologic and faulting studies. Furthermore, the proposed Project site does not lie within or near a State of California Alquist-Priolo Earthquake Special Studies Zone (A-P Zone) (CGS, 1999). A-P Zones are established by the State Geologist to regulate construction of buildings for human occupancy within narrow zones adjacent to active faults (Sanitation District of Los Angeles County Planning Section and AECOM, 2014).

Although the City's Safety Element provides other faults like the Scholl Canyon Fault (Plate 1-1 of the Safety Element), the closest active or potentially active earthquake fault is the Verdugo Fault located 0.3 miles to the southwest of the proposed Project site (Appendix E). The deterministic seismic hazard



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assessment performed for the proposed Project includes ground motion estimates from a postulated M_w 6.9 earthquake on the Verdugo fault per the United States Geological Survey (USGS)/CGS 2008 Fault Model. The Verdugo Fault trace in this model actually comprises the Verdugo-Eagle Rock-San Rafael fault system, a northeast-dipping fault system that runs along the southwest base of the Verdugo Mountains and the San Rafael Hills. While the Verdugo Fault proper is considered by the State of California to be Holocene-active (i.e., active within the last 10,000 years), the Eagle Rock and San Rafael Faults are considered as having last experienced fault displacement in the Late Quaternary period (i.e. within the past 700,000 years). So, while the entire Verdugo-Eagle Rock-San Rafael fault system per the USGS/CGS 2008 Fault Model is considered in the ground motion estimates the proposed Project's geotechnical investigation, the southern portion of this fault system (i.e. the Eagle Rock and San Rafael faults) is not considered active. Furthermore, no evidence for surface rupture has been observed along Eagle Rock and San Rafael Faults (Weber et al., 1980). As such, the probability of earthquake surface rupture affecting the proposed Project site is considered very low (Sanitation District of Los Angeles County Planning Section and AECOM, 2014).

Additionally, the proposed Project is being constructed to comply with California Building Code, American Society of Civil Engineers (ASCE) minimum design load and associated criteria for buildings and structures (ASCE 7), and Glendale Building and Safety Code 2016 which considers the risk of seismic events impacting facilities and structures. Construction of the proposed Project will also include automatic seismically triggered shutoff valves on both the new natural gas line at the meter box and on the connection to the existing landfill gas pipeline that will shut off the flow of gas in the event of a seismic event.

Therefore, potential impacts related to rupture of a known earthquake fault or strong seismic ground-shaking are considered less than significant.

Mitigation Measures

No mitigation measures are required.

Ground Shaking

Please refer to Section 4.5.4.1.

Mitigation Measures

No mitigation measures are required. The Project impact on ground shaking is less than significant.

Liquefaction

Liquefaction is a phenomenon whereby loose, sandy soils below the water table lose strength in response to the cyclic build-up of earthquake-induced groundwater pore pressures. In severe cases, liquefied soils can lose nearly all strength, causing slope failures, ground distortion and settlement, and damage to overlying structures (GLA, 2012). According to the Glendale General Plan Hazards Map (Plate P-1) and the Earthquake Zones of Required Investigation Map for the Pasadena Quadrangle (CGS, 1999), the proposed Project site is outside of identified Liquefaction Hazard Zones.



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Within the vicinity of the proposed Project site, the aerial extent of potentially liquefiable alluvium is confined to the relatively narrow channel of the pre-development creek. Subsurface conditions near the toe of the landfill, in Scholl Canyon Park, generally consist of varying depths of alluvial materials overlying bedrock. Alluvial depths are highly variable, ranging from less than five feet along the flanks of the canyon to about 40 feet along the canyon axis. Alluvium generally consists of loose to very dense sand, silty sand, silty sand with gravel, gravelly sand, cobbles, and minor amounts of clayey sand.

GLA evaluated the stability of the proposed landfill slopes and proposed cut slopes in bedrock of the adjacent property (SCLF) for their geotechnical report (2012). During this investigation it was established that, although the proposed Project site would experience strong ground motions during the maximum considered earthquake design event, the calculated displacement of waste mass and potential liquefaction of alluvium at the toe of the waste fill, are considered to be tolerable (less than six inches) and in compliance with Title 27, Division 2, CCR.

Ongoing groundwater pumping within Scholl Canyon Park, to the west of the SCLF, the proposed water line, and where the western portion of the proposed gas line would terminate, is expected to prevent or minimize potential liquefaction at the toe of the SCLF by depriving sediments of the groundwater necessary for liquefaction (Sanitation District of Los Angeles County Planning Section and AECOM, 2014). In the very unlikely event of high groundwater, such as due to a cessation of pumping, in combination with the maximum credible earthquake (MCE) ($MCE = M_w^{63} 6.9$, $PHGA^{64} = 0.67 g^{65}$), surface manifestations of liquefaction at the SCLF, such as differential settlement and sand boils, would generally be confined to Scholl Canyon Park. This extreme worst-case liquefaction scenario is not expected to cause significant stability failures of the waste mass, and in no case, would any potential liquefaction-related failure extend very far up the landfill slope.

Additionally, the potential for seismically-induced dynamic settlements within the sandy alluvial soils at Scholl Canyon Park were calculated based on Cone Penetration Test (CPT) soundings advanced on the SCLF property. Similarly, it was determined that estimated dynamic settlements during the MCE would not be expected to significantly impact the waste fill. In addition, according to the geotechnical report for the landfill expansion (GLA, 2012), no significant impacts related to expansive soils would occur.

Subsurface conditions underlying the proposed Project site consist mainly of dense to very dense silty sands over slightly weathered, hard bedrock. Groundwater was not encountered during soil assessment (maximum depth explored 36.5 feet below ground surface) and it is anticipated that the groundwater level is below a depth that would affect planned construction. The Project site is located in an area where water bearing soils are not present. Consequently, the potential for liquefaction beneath the proposed Project site is negligible (Stantec, 2016).

⁶³ Magnitude weighted

⁶⁴ Peak horizontal ground acceleration

⁶⁵ Peak ground acceleration can be expressed in **g** (the acceleration due to Earth's gravity, equivalent to g-force) as either a decimal or percentage



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Power Generation Equipment

Due to the subsurface conditions underlying the proposed Project site consisting mainly of dense to very dense silty sands over slightly weathered, hard bedrock, combined with very deep groundwater levels in an area where water bearing soils are not present, the potential for liquefaction beneath the proposed Project site is negligible. Therefore, potential impacts related to liquefaction and expansive and unstable soils (i.e., settlement, subsidence, and collapse) are less than significant.

Gas and Water Lines

As described above, the extreme-worst-case liquefaction scenario is not expected to cause significant stability failures of the waste mass of the SCLF. Furthermore, the potential for seismically induced dynamic settlements within the sandy alluvial soils at Scholl Canyon Park during the MCE would not be expected to significantly impact the waste fill (Sanitation District of Los Angeles County Planning Section and AECOM, 2014). Therefore, impacts related to liquefaction and expansive and unstable soils (i.e., settlement, subsidence, and collapse) along the proposed water and gas lines are less than significant.

Mitigation Measures

No mitigation measures are required.

Landslides

Landslides are not listed in the Safety Element of the Glendale General Plan as an overlay constraint within Scholl Canyon (identified as “Low landslide incidence”). The SCLF is shown in the General Plan Slope Instability Map (Plate 2-4) as outside any areas identified as having slope instability (Low-Very High). Displacements of six to 12 inches are considered the maximum tolerable deformation for landfills with synthetic liner components. Because the MCE is more conservative than the Maximum Possible Earthquake (MPE) required by Title 27 (combined SWRCB/California Integrated Waste Management Board regulations for Solid Waste), the dynamic stability of the proposed landfill slopes exceeds Title 27 requirements.

The proposed Project site is also outside of Liquefaction Hazard Zones identified on the Glendale General Plan Hazards Map Plate P-1. Landslide Hazard Zones appear on Plate P-1 to be located directly to the south of the proposed Project site, most likely on the steep slopes where Scholl Canyon Road is located.

Power Generation Plant and Water Tanks

A cut native slope currently is proposed at the northeast end of the proposed Project site. At present, the slope is configured at 1.5:1 (horizontal:vertical). Erosion protection measures such as a drainage swale or bench (one at the top and one approximately mid-way down on the face of the slope) incorporated into the proposed Project design will reduce the potential for sloughing and raveling from the face of the slope. Project compliance with design requirements set forth by Uniform Building Code and the City’s Building and Safety Code will ensure maximum slope steepness is not exceeded. Therefore, impacts would be less than significant.



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Natural Gas and Water Pipelines

The proposed water line traverses the perimeter active landfill road and the southern boundary of the Scholl Canyon Golf Course to the northwest. The proposed gas line traverses and descends a terraced hillside into Scholl Canyon Park.

The gas line would be routed above-ground except for road crossings, along existing landfill roadways and down a terraced, engineered slope on an existing pipe rack to an existing SoCalGas meter. The terraced hillside down into Scholl Canyon Park is heavily landscaped and contains numerous water conveyance structures which serve to dissipate water flow and stabilize the slope. Therefore, impacts related to slope stability (i.e., landslides and lateral spreading) are considered less than significant.

Mitigation Measures

No mitigation measures are required.

Threshold: Result in substantial soil erosion or the loss of topsoil?

4.5.4.2 Erosion

Construction of the proposed Project will involve soil disturbing activities that may have the potential to result in soil erosion and loss of topsoil due to wind and/or water erosion. The Project would be designed, constructed, and operated with adequate stormwater run-off control measures to minimize erosion. In addition to diversion of surface water into conveyance features such as channels and culverts, other surface features would reduce flow velocities, as well as bind the soil to prevent erosion.

A cut slope is proposed at the northeast end of the proposed Project site. Shallower parts of the cut area could expose weathered rock susceptible to erosion. Erosion protection such as erosion-resistant vegetation, commercial erosion control mats or other means should be provided to minimize sloughing and raveling. An erosion control plan, which is subject to review and approval by the City Engineer, would be required prior to any demolition- and construction-related activities. Such plans must include procedures and equipment necessary to contain onsite soils and minimize potential for contaminated runoff from the proposed Project site. In addition to the erosion control plan, preparation and implementation of a SWPPP, Dust Control Plan and BMPs would also minimize construction-related impacts on soil erosion and post-Project operation would not generate surface flows that result in loss of topsoil or induce erosion.

As recommended in the geotechnical report dated January 4, 2016 (Appendix D), drainage on the cut slope at the northeast end of the proposed Project should be designed to prevent surface water from flowing over the face of the slope. At least one drainage swale or bench should be provided at the top of the slope and another one approximately mid-way down on the face of the slope. Incorporation of these Project design features, plans, and engineering methods would ensure soil erosion and/or loss of topsoil would be a less than significant level.



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Mitigation Measures

No mitigation measures are required, the impact on erosion is less than significant

Threshold: Would the Project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

4.5.4.3 Landslide

Power Generation Plant and Water Tanks

Due to the subsurface conditions underlying the proposed Project site consisting mainly of dense to very dense silty sands over slightly weathered, hard bedrock, combined with very deep groundwater levels in an area where water bearing soils are not present, the potential for landslides, lateral spreading, subsidence, liquefaction or collapse beneath the proposed Project site is negligible. Therefore, potential impacts related to liquefaction and expansive and unstable soils (i.e., settlement, subsidence, and collapse) are less than significant.

Natural Gas and Water Pipelines

As described above, the extreme worst-case liquefaction scenario is not expected to cause significant stability failures of the waste mass of the SCLF. Furthermore, the potential for seismically induced dynamic settlements within the sandy alluvial soils at Scholl Canyon Park during the MCE would not be expected to significantly impact the waste fill (Sanitation District of Los Angeles County Planning Section and AECOM, 2014). Therefore, potential impacts related to liquefaction and expansive and unstable soils (i.e., settlement, subsidence, and collapse) along the proposed water and gas lines are less than significant. Please also refer to Section 4.5.4.4.

Mitigation Measures

No mitigation measures are required.

4.5.4.4 Lateral Spreading

Lateral spreading typically occurs as a form of horizontal displacement of relatively flat-lying alluvial material toward an open or “free” face such as an open body of water, channel, or excavation. This movement is generally due to failure along a weak plane and may often be associated with liquefaction. As cracks develop within the weakened material, blocks of soil displace laterally toward the open face. Subsurface conditions underlying the proposed Project site mainly consist of dense to very dense silty sands over slightly weathered, hard bedrock, combined with very deep groundwater levels in an area where water bearing soils are not present. It is anticipated that the groundwater level is below a depth that would affect planned construction. Due to the depth of groundwater, the potential for lateral spreading is considered minimal. Impacts would be less than significant.



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Mitigation Measures

No mitigation measures are required.

4.5.4.5 Subsidence

Please refer to section 4.5.4.6.

Mitigation Measures

No mitigation measures are required, the Project's impact from subsidence is less than significant.

4.5.4.6 Liquefaction

Please refer to Section 4.5.4.3 and 4.5.4.6.

Mitigation Measures

No mitigation measures are required, the Project's impact from liquefaction is less than significant.

4.5.4.7 Collapse

Please refer to Section 4.5.4.6.

Mitigation Measures

No mitigation measures are required, the Project impact from collapse is less than significant.

Level of Significance After Mitigation

Less than Significant Impact

Threshold: Would the Project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code, creating substantial direct or indirect risks to life or property?

4.5.4.8 Power Generation Plant and Water Tanks

Based on the subsurface investigation conducted as part of the subject site geotechnical evaluation (Stantec, 2016), The near-surface materials (upper eight feet) consist of silty sand and quartz diorite bedrock. The predominantly granular soils and rock are not considered expansive, as identified in Table 18-1-B of the Uniform Building Code (1994), and do not create substantial risks to life or property. Design for expansive soils is not required. If imported soils are used for earthwork, the proposed materials will be evaluated for expansion potential prior to import, per Uniform Building Code and the Glendale Building and Safety Code 2016 and approved by the proposed Project Geotechnical Engineer prior to utilization. Imported soil will consist of predominately granular non-detrimentally expansive (Expansion Index less than 20) material free of organics, debris and rocks greater than four inches in any dimension. Due to the absence of expansive soils within the subject site footprint, and regulations prohibiting the use of



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expansive soils, potential impacts associated with presence of expansive soils would be less than significant.

4.5.4.9 Natural Gas and Water Pipelines

Any native or imported soils used onsite during installation of the below-grade portion of the pipelines would be placed and compacted in accordance with Uniform Building Code and Glendale Building and Safety Code 2016. Potential impacts from expansive or collapsible soils would therefore be less than significant.

Mitigation Measures

No mitigation measures are required, the Project impact from expansive soils is less than significant.

4.5.5 Cumulative Impacts

The proposed Project and other projects considered in this cumulative impact analysis would be subject to conformance with applicable building codes and standards as well as erosion control requirements intended to reduce the potential for geology and soils impacts to occur. The nature and type of these projects does not have the potential to magnify the potential for geology and soils impacts by increasing the potential for fault rupture, strong seismic ground shaking, seismic-related ground failure, liquefaction, landslides, expansive soils, unstable soils or erosion. The proposed Project would not have cumulatively considerable geology and soils impacts.

